

Option 1: Commit Now to a Permanently Manned Civil Space Station

Discussion--Con's: Opponents of this option argue that a commitment now to a permanently manned civil Space Station would be premature and a serious error. There are major risks to making a commitment now to a permanently manned Space Station:

- o There is a major risk that the estimated cost for the proposed program is understated because of the number of major related items not defined or costed, the "technology push" character of the program, the inflationary effects of the competition for resources in the industrial base, and the history of cost growth for other major space projects. The effect of cost growth (e.g., technical problems, schedule slips imposed by outside requirements, necessary enhancements) on programs of this magnitude would likely require abandonment of other priority activities or overall funding increases unacceptable to either the Administration or the Congress.
- o Regardless of the accuracy of the cost estimates, diversion of resources to pursue a permanently manned Space Station at this time could:
 - Threaten NASA's ability to satisfy the national priority of making the STS fully operational and cost effective. While the STS has been declared programmatically operational, the full range of capabilities required to make it fully operational or cost-effective have not been demonstrated.
 - Threaten NASA's ability to adequately fund a balanced set of science, technology, and planetary exploration programs, as was the case during the STS development.

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- o The justification for a Space Station presumes a large number of activities which are not yet approved or funded. This civil Space Station could adversely affect current and projected national security programs and priorities as well as other NASA programs.
- o The space-oriented segment of the industry is heavily committed to ongoing efforts. A large new program on the scale of the proposed manned Space Station would likely result in serious inflationary pressures as resources in short supply are placed in further competition. Also, important technical manpower resources could be diverted. The anticipated recovery of the commercial aircraft market will further increase this competitive pressure for fiscal and technological resources.
- o A commitment now to a civil Space Station could result in major problems later for both civil and national security programs. Although there are currently no national security requirements for a permanent Space Station, there would be inevitable pressures for national security programs to apply the civil Space Station capabilities to meet national security requirements that might be later defined. This would likely result in significant cost and schedule problems for both civil and military programs.
- o The justification for a civil Space Station is predicated upon several unsubstantiated assertions, thereby increasing the risk of a commitment now.
 - The projected mission model developed by NASA for this option does not reflect the lessons learned from the STS program. Initial projections of Shuttle launch requirements have so far decreased by 60%. If similar shrinkage is experienced in the Space Station mission model, the efficiency and effectiveness of the Space Station option would be seriously reduced; there is a significant risk that this shrinkage will occur.
 - The contractor-developed mission model did not assume any fiscal restraint on the definitions of future missions and may have led to more Space Station missions than could be reasonably funded.
 - The statement that a manned Space Station offers significant technology benefits is incomplete. Automated space programs may offer greater technology spinoffs than would be achieved by pursuing a manned Space Station program.
 - The claim that the Space Station could enable extensive commercial exploitation of space by providing capabilities currently not available to the private sector is unsupported. The assertion that the contribution of man in space to the manufacturing process outweighs the high cost of supporting his presence is also not justified.

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- The utility, cost-effectiveness, and desirability of servicing and repairing satellites in orbit has yet to be demonstrated. Nevertheless, it is not clear that a significant increase in capability to perform these functions would be afforded by a Space Station over the Shuttle. In fact, the Shuttle can go to a wide range of satellite orbits whereas these satellites would have to be brought to the Space Station.
 - There may be high risk in designing a capability to assemble and check out large space structures given our limited experience to date. It is premature to commit to an extensive development program for second generation construction and check-out missions before any demonstrations of the first generation capabilities have taken place with the Shuttle.
 - Many of the capabilities ascribed to this option are not unique to a permanently manned Space Station. Data has not been presented which makes clear which missions require permanent manned presence versus those that may be better supported by unmanned platforms.
 - It is not clear that many of the potential "opportunities" could justify the investment cost of the Space Station, especially if users had to ultimately bear a fair share of that cost.
- o The Presidential commitment to an accelerated program for a manned Space Station could define a "race" in which the U.S. would be widely perceived as having already lost. The Soviets have a Space Station on-orbit and plan to have a more advanced station in place well before any of the NASA program options. This is comparable to the situation the Soviets find themselves in with regard to the Shuttle where their version cannot be operational until years after the start of the highly publicized U.S. program.
- o NASA's interpretation that the Soviet manned space program is the primary challenge to U.S. civil leadership in space is overstated. The Soviet manned Space Station program appears to be driven, at least in part, toward manned involvement because of the lack of a technology base to support more complex automated systems. By contrast, U.S. objectives are being met through extensive reliance on highly successful, technologically advanced automated systems.
- The suggested ultimate benefits from manned Space Stations, such as enabling national programs to establish a manned lunar base or a manned mission to Mars, would require additional resources far beyond those suggested in Option 1 and might be more efficiently enabled by other means.

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Option 3: Defer commitment to either Option 1 or Option 2 pending additional definition of requirements, costs, and risks

Description. This option requires the development of better documentation on Space Station missions and the utility of man in space before major hardware commitments are made. It would also require that a Space Station decision be put in context with other major new space-related activities such as defense against ballistic missiles and future space systems survivability enhancements.

Discussion--Pro's: The proponents of this option believe:

- o A Space Station decision should not be made before the results of the pending national security studies, e.g., defense against ballistic missiles, future space system survivability enhancements, are completed. A premature decision to make a major commitment to a civil Space Station may preclude the ability to fund these potentially higher priority initiatives.
- o This option would avoid the major risks associated with Option 1.
 - It would permit the better definition required to improve confidence in the cost estimates for a manned Space Station. The better the definition before a program commitment, the less likely will be the risks of significant subsequent cost growth.
 - By deferring a commitment now, NASA can continue to focus on its top priority--making the Shuttle fully operational and cost effective. This continued focus on the Shuttle would also permit experience to be gained with man-intensive operations (e.g., Solar Maximum Mission retrieval, deployment and retrieval of large national security payloads).
 - It would provide more time to explore potential future national requirements before making a commitment to a specific system configuration. This could avoid the potential major costs to both the Space Station and national security programs of later modifying the Space Station if future national security needs are identified.
- o The challenge from the Soviet manned space program is not a race in time; it is a competition to achieve the best capability. While they can deploy an advanced Space Station before the U.S., our technological superiority will allow us to achieve a superior capability only if we take the time now to carefully define our objectives.
- o The capability selected now for a manned Space Station will define the space infrastructure into the next century. It is vitally important that our decisions now be based on the best possible information.

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